

Lichenicolous fungi invading lichens on gypsum soils in southern Spain

Josef HAFELLNER & Manuel CASARES-PORCEL

Abstract: HAFELLNER J. & CASARES-PORCEL M. 2003. Lichenicolous fungi invading lichens on gypsum soils in southern Spain. – *Herzogia* 16: 123–133.

Twenty taxa of lichenicolous fungi (4 lichenized, 16 non lichenized) are reported from host lichens which develop over compact gypsum or gypsum soils, mainly from southern Spain. It is conjectured that the synthesis of squamaron in thalli of *Squamarina cartilaginea* is caused by an infection with *Clypeococcum epicrassum*.

Zusammenfassung: HAFELLNER J. & CASARES-PORCEL M. 2003. Über lichenicole Pilze, die Flechten auf Gipsböden in Südspanien besiedeln. – *Herzogia* 16: 123–133.

Zwanzig Taxa lichenicoler Pilze (4 lichenisierte, 16 nichtlichenisierte) werden als Besiedler von Flechten nachgewiesen, die sich in Südspanien auf Gipsböden angesiedelt haben. Es wird die Vermutung geäußert, daß die Synthese von Squamaron in Thalli von *Squamarina cartilaginea* auf eine Infektion mit *Clypeococcum epicrassum* zurückgeht.

Key words: Ascomycetes, deuteromycetes, biodiversity, Iberian Peninsula.

Introduction

Gypsum is a mineral that under at least temporarily arid climatic conditions can remain unweathered for a relatively long time on the earth's surface. Such gypsum outcrops are known from a number of localities in Europe and abroad. Under arid conditions, higher plant vegetation commonly is not very dense and much space on the ground is available for synusiae dominated by cryptogams, mainly lichens and cyanobacteria. On the Iberian Peninsula, the lichen flora and lichen vegetation on gypsum soil has been quite well studied (LLIMONA PAGES 1974, CRESPO & BARRENO 1975, TARAZONA LAFARGA et al. 1980, BURGAZ & MENDIOLA 1984, CASARES-PORCEL & GUTIÉRREZ-CARRETERO 1993, GUTIÉRREZ & CASARES 1994, MARTÍNEZ-SÁNCHEZ et al. 1994, LLIMONA PAGÈS et al. 1998). The same can be said for other locations in Europe (MÜLLER ARG. 1881, REIMERS 1940, MARSTALLER 1968, 1971, NOWAK 1974, NIMIS et al. 1996, STORDEUR & ERNST 2002, STORDEUR 2003) and elsewhere, e.g. northern Africa (CASARES-PORCEL et al. 1994), and North America (ANDERSON & RUSHFORTH 1977). Single species have also been reported from other localities in Europe (e.g. HAFELLNER & MAYRHOFER 1977), Asia (POELT et al. 1995) and North America (ST. CLAIR & WARRICK 1987, WEBER & NASH 1992, LADYMAN et al. 1999). Several lichen species have been described which seem to be confined to gypsum soils (LLIMONA PAGES 1974, CASARES-PORCEL et al. 1996, POELT et al. 1995), some of which are regarded as endangered (GUERRA et al. 1995).

These soil lichens are inhabited by a number of lichenicolous fungi, both lichenized and non-lichenized, a few of which are highly characteristic and mentioned under various names in the classical work on gypsum lichens by LLIMONA PAGES (1974). As with the lichens, some of the lichenicolous fungi are so far known only from gypsum localities, e.g. *Polycoccum epizoharyi*

Calatayud & V. Atienza, *Llimoniella scabridula* (Müll. Arg.) Nav.-Ros. & Hafellner, and *L. adnata* Hafellner & Nav.-Ros.

Only at a single locality near Los Monegros in the Ebro valley have the lichenicolous fungi been studied in detail together with their hosts (LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO ROSINÉS 1999); in contrast, only single specimens have been recorded from localities in southern Spain and no comprehensive account has been compiled so far. Such an account is presented below.

Material and methods

Dried herbarium specimens cited together with the treatments of the species have been used. External morphology was studied with a dissecting microscope (WILD M3, 6,4 ×–40 ×). Anatomical studies of the thallus and the ascomata were carried out by use of light microscope (LEITZ DMRE, 40 ×–1000 ×). Sectioning was performed with a freezing microtome (LEITZ, sections of 12–15 mm) but squash preparations were also used, especially for ascus analysis. Preparations were mounted in water, or when necessary, pretreated with lactic acid-cotton blue (MERCK 13741). Amyloid reactions in hymenia were observed using Lugol's reagent (MERCK 9261). Conidiogenesis of pycnoconidia was studied in erythrosin B (ALDRICH 19,826-9) in 10 % ammonia. Sections and squash preparations were not pretreated with KOH, unless otherwise stated. Measurements refer to dimensions in water. Specimens of the cited species are preserved in the herbarium GZU unless otherwise indicated.

Author's abbreviations are those proposed by BRUMMITT & POWELL (1992). Nomenclature of the host lichens follows LLIMONA & HLADUN (2001).

List of visited localities in southern Spain (Andalusia) at which lichenicolous taxa have been observed:

- A 01: Almería: La Sartenilla, UTM 30SWF5297, 400 m, sobre suelos yesíferos, 19.II.1988, leg. M. Casares-Porcel
- A 02: Almería: junto al "Minihollywood", UTM 30SWF4899, 500 m, sobre suelo yesífero, 19.II.1988, leg. M. Casares-Porcel
- A 03: Almería: Venta de los Yesos, UTM 30SWG6205, 500 m, sobre suelo yesífero, 20.II.1988, leg. M. Casares-Porcel
- A 04: Almería: El Cerrón, UTM 30SWG8309, 400 m, sobre suelo yesífero, 18.III.1988, leg. M. Casares-Porcel
- A 05: Almería: camino a Marchalico Viñicas, UTM 30SWG8507, 400 m, sobre suelo yesífero descubierto / a la sombra de *Stipa tenacissima*, 18.III.1988, leg. M. Casares-Porcel
- A 06: Almería: proximidades de Molinico de Río Aguas, UTM 30SWG8105, 400 m, sobre suelo yesífero, 19.III.1988, leg. M. Casares-Porcel
- A 07: Almería: El Yesón Alto, UTM 30SWG4300, 550 m, sobre suelo yesífero, 10.III.1989, leg. M. Casares-Porcel
- A 08: Almería: Loma de los Yesares, UTM 30SWF8997, 200 m, sobre suelos yesíferos, 15.VI.1989, leg. M. Casares-Porcel & L. Gutiérrez-Carretero
- A 09: Almería: Barranco del Huelí, UTM 30SWG8004, 450 m, sobre suelos yesíferos / costra de yeso compacta / en microlapiaz de yeso cristalino, 16.VI.1989, leg. M. Casares-Porcel & L. Gutiérrez-Carretero
- A 10: Almería: Collado del Manco, UTM 30SWF6184, 290 m, 20.I.1990, leg. M. Casares-Porcel
- A 11: Almería: Bentarique, Barranco de las Canales, UTM 30SWF3295, 390 m, 9.VIII.1986, leg. A. Gómez-Bolea

- A 12: Almería: Campo de Tabernas, Gipshügel bei Venta de los Yesos UTM 30SWG6104, 500 m, S der Abzweigung nach Turrillas, ca. 500 m, 21.IX.1980, leg. J. Hafellner
- G 01: Granada: Camino de Benamaurel, UTM 30SWG2456, 675 m, sobre suelos yesíferos, 26.II.1988, leg. M. Casares-Porcel, A. Ruperez & L. Gutiérrez-Carretero
- G 02: Granada: Carretera de Benamaurel (Monzon), WG 2456, 675 m, sobre suelos yesíferos, 26.II.1988, leg. M. Casares-Porcel, A. Ruperez & L. Gutiérrez-Carretero
- G 03: Granada: entre Benamaurel y Castril, Cañada del Charcón, WG 2566, 720 m, sobre marga yesífera, 26.II.1988, leg. M. Casares-Porcel, A. Ruperez & L. Gutiérrez-Carretero
- G 04: Granada: Benamaurel, WG 3069, ca. 700 m, sobre suelos yesíferos descubiertos, 5.III.1988, leg. M. Casares-Porcel, L. Gutiérrez-Carretero & A. Ruperez
- G 05: Granada: proximidades del cruce entre la carretera de Benamaurel y Castillejas, UTM 30SWG2565, ca. 700 m, sobre costra de yeso, 5.III.1988, leg. L. Gutiérrez-Carretero & M. Casares-Porcel
- G 06: Granada: Cañada del Caballo, WG 2861, 850 m, sobre suelo yesífero protegido por la vegetación superior, 25.III.1988, leg. M. Casares-Porcel, L. Gutiérrez-Carretero & A. Ruperez
- G 07: Granada: Cañada del Caballo, WG 8309, 400 m, sobre suelo yesífero entre musgos, 25.III.1988, leg. M. Casares-Porcel & L. Gutiérrez-Carretero
- G 08: Granada: entre Baza y Cullar Baza, UTM 30SWG3255, 850 m, sobre suelos yesíferos / protegido por *Stipa tenacissima*, 2.II.1990, leg. M. Casares-Porcel, L. Gutiérrez-Carretero & A. Ruperez
- J 01: Jaén: Arroyo de la Cuevezuela, UTM 30SWG3686, 375 m sobre suelo yesífero, 28.VI.1984, leg. M. Casares-Porcel

The species

Acarospora reagens Zahlbr.

Host: *Diploschistes diacapsis* (1)

Loc.: A 05 (1)

Notes: This species belongs in the *A. nodulosa* group, of which it is sometimes regarded as subspecies (e.g. CLAUZADE et al. 1981). Although it is frequently reported from gypsum soils (LLIMONA PAGES 1974: 7, CASARES-PORCEL & GUTIÉRREZ-CARRETERO 1993: 366 ff., GUTIÉRREZ & CASARES 1994: 345), it is not restricted to that type of substratum but may also grow on other, preferably calcareous soils. *Acarospora reagens* is a facultative invader of terricolous *Diploschistes* species (RAMBOLD & TRIEBEL 1992). It is interesting, that *Diploschistes* supports several *Acarospora* species which either belong to the subgen. *Acarospora* or to the *A. nodulosa* group, but no brown *Acarospora* is among them. This supports Magnusson's opinion that the *A. nodulosa* group has derived from a yellow ancestor. The first parasitic collection from Spain, preserved in the herbarium Montagne in PC, was published by Magnusson (1929: 273). We have seen populations of *A. reagens* with at least partly parasitic behaviour from Europe, Asia (Cyprus) and Africa (Canary Islands).

Amandinea punctata (Hoffm.) Coppins & Scheid.

Hosts: *Lepraria crassissima* var. *isidiata* (1), *Squamarina lentigera* (2)

Loc.: A 01 (2), A 07 (1)

Notes: *Amandinea punctata* has a very broad ecological amplitude but prefers habitats influenced by either inorganic or organic salts. It may also grow on the edges of thalli of terricolous lichens. Thalli with a lichenicolous habit have often been misidentified and even newly described several times as species of *Karschia* (see HAFELLNER 1979, under *Buellia p.*).

Arborillus llimonae Munt.-Cvet. & Gómez-BoleaHost: *Diploschistes diacapsis* (1)

Loc.: A 09 (1), G 02 (1), G 08 (1)

Notes: *Arborillus llimonae* resembles a lichenicolous *Chaenothecopsis* but is a hyphomycete, invading some *Diploschistes* species. We have known the species for many years from some localities in southern Spain, but hesitated to describe it as we could not establish its relationships. It was eventually described by MUNTAÑOLA-CVETKOVIC & GÓMEZ-BOLEA (1998) with the type originating from a gypsum habitat in the Ebro valley. It was later found by KOCOURKOVÁ (2000) in the Czech Republic and by HAFELLNER (2002) on El Hierro as an inhabitant of *D. scruposus*.

Caloplaca inconnexa (Nyl.) Zahlbr.Host: *Aspicilia contorta* subsp. *hoffmanniana* (1)

Loc.: A 05 (1), A 07 (1) (both GDA)

Notes: This taxon has been recorded by GUTIÉRREZ & CASARES (1994) as subspecies of *C. tenuatula*) from several localities in the province of Almería. According to these authors, previous records of *C. necator* Clauzade & Poelt from gypsum outcrops (e.g. by LLIMONA PAGES 1974) belong here.

Cercidospora crozalsiana (H.Olivier) Nav.-Ros., Cl.Roux & CasaresHosts: *Squamarina cartilaginea* (1), *Squamarina lentigera* (2)

Loc.: A 03 (2), A 05 (2), A 06 (1), A 08 (2), G 01 (2), G 03 (2)

Further specimens studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, (2), 11.III.1991, leg. J. Etayo no. 11043 (GZU). – Ibid., (1), 11.III.1991, leg. J. Etayo (GZU).

Notes: This species has been recorded from several gypsum outcrops in Spain (NAVARRO-ROSINÉS et al. 1995: 102, LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO-ROSINÉS 1999).

Cercidospora epidesertorum Nav.-Ros. & Calatayud ined.Host: *Fulgensia desertorum* (1)

Loc.: G 01 (1), G 03 (1)

Notes: *Cercidospora epidesertorum* will be treated in detail in a forthcoming publication. The species has been recorded by LLIMONA PAGÈS et al. (1998) and LLIMONA & NAVARRO-ROSINÉS (1999) from the gypsum outcrops near Los Monegros in Aragón.

Clypeococcum epicrassum (H.Olivier) Nav.-Ros. & Cl.RouxHosts: *Squamarina cartilaginea* (1), *Squamarina lentigera* (2)

Loc.: A 03 (1), A 05 (2), A 09 (2), A 12 (1), G 01 (1), G 07 (1)

Further specimen studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, 11.III.1991, leg. J. Etayo no. 11037 (GZU).

Notes: *Clypeococcum epicrassum* is a frequent inhabitant of *Squamarina* species in the mediterranean region. Infections of a certain age are often surrounded by a circular red zone. Such specimens often also have red spots with the external appearance of a lichenicolous red-fruited *Arthonia* but do not contain any fructification of a lichenicolous fungus. Specimens with only red spots and without a determinable lichenicolous fungus are not rare either. The red pigment was identified by HIMMELREICH et al. (1994) as a new naphthoquinone called squamarone, but those authors could not explain the cause of the pigmentation. It is very likely, that the pigment is synthesised by the *Squamarina* as a response to an infection with *Clypeococcum epicrassum*. If this interpretation is correct, this would be a further example that an infection of a lichen can induce the synthesis of a lichen substance. Other documented cases are the infection of *Roccella* species by *Lecanographa grumulosa* (FEIGE et al. 1993) and the infection of *Cladonia norvegica* or *C. bacilliformis* by a mite (TIMDAL 1989).

The species has been recorded by several authors (NAVARRO-ROSINÉS et al. 1994a, ETAYO & BREUSS 1996, LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO-ROSINÉS 1999) from the gypsum outcrops in Aragón, but it is also known from other localities in Spain (e.g. SANTESSON 1960, NAVARRO-ROSINÉS et al. 1994b, ATIENZA & SEGARRA MORAGUES 1999).

Lichenochora epidestorum Nav.-Ros.

Host: *Fulgensia desertorum* (1)

Loc.: G 03 (1)

Further specimen studied: Prov. Madrid, Gipshügel E von Ciempozuelos, S von Madrid, ca. 600 m, (1), 12.IX.1980, leg. A. Crespo & J. Hafellner no. 8597 (GZU).

Notes: NAVARRO-ROSINÉS et al. (1998) recently revised the *Lichenochora* species inhabiting mediterranean species of *Fulgensia* and were able to demonstrate the presence of three species, including one restricted to *Fulgensia desertorum*. The species has been recorded by LLIMONA PAGÈS et al. (1998) and LLIMONA & NAVARRO-ROSINÉS (1999) from the gypsum outcrops near Los Monegros in Aragón.

Lichenostigma rouxii Nav.-Ros., Calatayud & Hafellner

Host: *Squamarina cartilaginea* (1)

Specimen studied: Spain: Aragón, Prov. Zaragoza, La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, (1), 11.III.1991, leg. J. Etayo (GZU).

Notes: *Lichenostigma rouxii* was recently described (in CALATAYUD et al. 2002) as a specific inhabitant of *Squamarina* species, on which it develops relatively thick and isolated hyphal strands. So far it has not been found on Andalusian gypsum outcrops, but may well be there as suggested by the specimen from the Ebro valley.

Lichenostigma rugosa G.Thor

Host: *Diploschistes diacapsis* (1)

Loc.: A 01 (1), A 07 (1)

Further specimen studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, (1), 11.III.1991, leg. J. Etayo no. 10642 (GZU). – Los Monegros, Gipshügel ca. 5 km N von Bujaraloz, ca. 70 km E von Zaragoza, ca.

250 m, offenes Juniperetum thuriferae, (1), 25.V.1983, leg. J. Hafellner no. 17422 (GZU).

Notes: This species has been recorded from a number of localities in Spain (LLIMONA & HLADUN 2001). It is evidently common on *Diploschistes* growing in at least temporarily arid situations. *Diploschistes* populations on gypsum outcrops and soils are frequently infested, and such records have been published by several authors (THOR 1985, ETAYO & BREUSS 1996, LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO-ROSINÉS 1999) from localities in Aragón, although substrate information may not be given in all cases.

Lichenostigma semiimmersa Hafellner

Host: *Buellia zoharyi* (1)

Loc.: G 05 (1)

Notes: *Lichenostigma semiimmersa* was originally described as specific inhabitant of *Buellia elegans* (HAFELLNER 1999) and was later also recorded upon *Buellia zoharyi* in a collection of the host originating from central Spain (TRINKAUS & MAYRHOFER 2000: 304, 308). This is only the second record of this species in Spain.

Llimoniella scabridula (Müll.Arg.) Nav.-Ros. & Hafellner

Hosts: *Acarospora nodulosa* (1), *Acarospora placodiiformis* (2)

Loc.: A 02 (1), A 11 (1), G 07 (2)

Further specimen studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesifero, (2), 11.III.1991, leg. J. Etayo no. 11044 (GZU).

Notes: Surprisingly this lichenicolous discomycete, which is a specific inhabitant of terricolous *Acarospora* taxa of the *A. nodulosa* group, has been described from Central Europe, although it is much more common in the mediterranean region. In Spain, it was first reported by LLIMONA PAGÈS (1974: 11) under the name *Nesolechia* sp. before its identity could be established. It has since been recorded from a number of gypsum localities, including some in Andalusia (CASARES-PORCEL & GUTIÉRREZ-CARRETERO 1993, HAFELLNER & NAVARRO-ROSINÉS 1993, LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO-ROSINÉS 1999, DIEDERICH & ETAYO 2000).

Muellerella lichenicola (Sommerf.: Fr.) D.Hawksw.

Host: *Aspicilia contorta* subsp. *hoffmanniana* (1)

Specimen studied: Spain: Aragón, Prov. Zaragoza: Gipshügel mit Halbwüstenvegetation kurz N von Alfajarín, SE von Zaragoza, ca. 220 m, (1), 25.V.1983, leg. J. Hafellner no. 17396 (GZU).

Notes: *Muellerella lichenicola* is a widespread species on a wide range of lichens (see e.g. TRIEBEL 1989). So far it has not been found at the localities of Andalusian gypsum outcrops, but may well be there as the specimen from the Ebro valley indicates.

Polycoccum arnoldii (Hepp) D.Hawksw.

Host: *Diploschistes diacapsis* (1)

Specimens studied: Spain: Aragón, Prov. Zaragoza: Gipshügel mit Halbwüstenvegetation kurz N von Alfajarín, SE von Zaragoza, ca. 220 m, (1), 25.V.1983, leg. J. Hafellner (herb. Hafellner)

Notes: This is the first reliable record of *P. arnoldii* from Spain. BOQUERAS et al. (1989: 52) mentioned a taxon "ex aff." of *P. arnoldii*, but that is very unlikely to be identical as it was reported on the epiphytic *Lecania cyrtellinoides*. So far *P. arnoldii* has not been found at the localities of Andalusian gypsum outcrops, but may well be there as the specimen from the Ebro valley indicates.

Polycoccum epizoharyi Calatayud & V. Atienza

Host: *Buellia zoharyi* (1)

Loc.: A 06 (1)

Notes: *Polycoccum epizoharyi* was described by CALATAYUD & ATIENZA (2000) on the basis of two specimens originating from the same locality south of Madrid from a population of *Buellia zoharyi* over gypsum soil. Thus our record represents only the second locality for this taxon.

Rhizocarpon malenconianum (Llimona & Werner) Hafellner & H. Mayrhofer

Host: *Diploschistes diacapsis* (1)

Loc.: A 04 (1)

Further specimen studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, 11.III.1991, leg. J. Etayo no. 11033 (GZU).

Notes: This obligately lichenicolous species with a weakly developed thallus was originally described in the genus *Leciographa* (LLIMONA & WERNER 1975: 399) and was only later recognized as belonging to *Rhizocarpon* (HAFELLNER & MAYRHOFFER 1977). It is known from a few scattered localities in Spain (LLIMONA & WERNER 1975, CRESPO & BARRENO 1975, CASARES-PORCEL & GUTIÉRREZ-CARRETERO 1993, GUTIÉRREZ & CASARES 1994, LLIMONA PAGÈS et al. 1998, LLIMONA & NAVARRO-ROSINÉS 1999). Isotypes from the locality in Huesca have been distributed by VĚZDA (1975) in the Lichenes selecti exsiccati no. 1299. Outside Spain it is known from Macedonia (HAFELLNER & MAYRHOFFER 1977), Norway (POELT 1990), as well as Morocco (CASARES-PORCEL et al. 1994).

Stigmidium psorae (Anzi) Hafellner in Vězda

Hosts: *Psora decipiens* (1), *Psora saviczii* (2)

Loc.: A 06 (1), G 01 (1), G 07 (1), J 01 (1)

Further specimen studied: Spain: Aragón, Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, (2), 11.III.1991, leg. J. Etayo no. 11042 (GZU).

Notes: *Stigmidium psorae* is a lichenicolous fungus which is clearly restricted to the *P. decipiens* group. Together with its frequent host *P. decipiens*, it can be found in Europe from mediterranean lowlands up to high elevations in temperate mountains. Outside Europe, it has been reported from Asia and North America (TRIEBEL 1989). In their study on the distribution of *Psora saviczii*, POELT et al. (1995) state that they often saw adjacent squamules of *P. decipiens* infested by this lichenicolous fungus but never *P. saviczii*. However, CALATAYUD & TRIEBEL (1999: 441) have recorded *Psora saviczii* as an additional host species, an observation which is confirmed here with a further collection.

In mainland Spain it was previously reported by NAVARRO-ROSINÉS et al. (1994b) and CALATAYUD & TRIEBEL (1999).

Stigmidium tabacinae (Arnold) Triebel

Hosts: *Toninia sedifolia* (1), *Toninia toepfferi* (2), *Toninia tristis* (3), *Toninia* spec. (4)

Loc.: A 01 (4), A 03 (4), A 04 (2), A 07 (1), A 09 (2, 4), A 11 (3), G 03 (4), G 04 (1), G 07 (4)

Notes: *Stigmidium tabacinae* is one of the most common lichenicolous fungi on terricolous lichens in arid habitats. It has previously been reported in mainland Spain by NAVARRO-ROSINÉS et al. (1994b).

Additional unresolved taxa

?*Sphaerellothecium* spec.

Hosts: *Squamarina lentigera* (1)

Loc.: A 03 (1), G 01 (1)

Further specimen studied: Spain: [Aragón], Prov. Zaragoza: Los Monegros, Gipshügel ca. 5 km N von Bujaraloz, ca. 70 km E von Zaragoza, ca. 250 m, offenes Juniperetum thuriferae, on *Squamarina lentigera* (thallus), 25.V.1983, leg. J. Hafellner no. 41402 (herb. Hafellner). – Prov. Zaragoza: La Retuerta, Pina de Ebro ca. 35 km SE de Zaragoza, ca. 200 m; sobre suelo yesífero, (1), 11.III.1991, leg. J. Etayo (herb. Hafellner 57922).

Notes: It has been pointed out by CALATAYUD et al. (2002) that thalli of *Squamarina* species support at least two lichenicolous fungi which build dark, superficial hyphae or hyphal strands, *Lichenostigma rouxii* and a hitherto undescribed taxon, possibly a *Sphaerellothecium* species. It is very likely that the record by ETAYO & BREUSS (1996, under *S. cf. araneosum*) from a locality in Navarra on *S. lentigera* belongs here. However, the record by NAVARRO-ROSINÉS et al. (1994b, under *S. araneosum*) on *S. gypsacea* from Catalunya, according to a duplicate preserved in GZU, does not refer to the same species but belongs to a different taxon whose superficial hyphae are much more delicate.

?*Stigmidium* spec.

Hosts: *Acarospora reagens* (1)

Loc.: A 01 (1)

Further specimen studied: Spain: Prov. Madrid, Gipshügel E von Ciempozuelos, S von Madrid, ca. 600 m, (1), 12.IX.1980, leg. A. Crespo & J. Hafellner no. 8591 (herb. Hafellner).

Notes: This is an ascomycete of unclear generic position, with fissitunicate asci containing one-septate hyaline ascospores, living on the thallus of *Acarospora reagens*, and is reported here for the first time. It is not conspecific with *Stigmidium fuscatae* (Arnold) R.Sant., an inhabitant of taxa of the *Acarospora fuscata* group, nor with *S. epixanthum* Hafellner, a frequent species on yellow *Acarosporas* (see HAFELLNER et al. 2002). Further comparative studies are necessary to clarify its taxonomic relationship.

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Adresses of the authors

Josef Hafellner, Institut für Botanik, Karl-Franzens-Universität, Holteigasse 6, A-8010 Graz, Austria. E-mail: josef.hafellner@uni-graz.at

Manuel Casares-Porcel, Departamento de Botánica, Facultad de Farmacia, Universidad de Granada, E-18071 Spain. E-mail: mcasares@ugr.es

